# Au+Au reactions at RHIC energies: The effects of secondary interactions[1]

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One of the major goals of the relativistic heavy ion collider (RHIC) at Brookhaven National Laboratory is to explore the phase diagram of hot and dense matter near the quark gluon plasma (QGP) phase transition.

The Ultra-relativistic Quantum Molecular Dynamics model (UrQMD)[2] is used to study global observables in central reactions of Au+Au at $\sqrt{s}$ = 200 AGeV (RHIC). This microscopic transport approach is based on the covariant propagation of constituent quarks and diquarks accompanied by mesonic and baryonic degrees of freedom. It simulates multiple interactions of ingoing and newly produced particles, the excitation and fragmentation of color strings and the formation and decay of hadronic resonances. In the UrQMD model, subhadronic degrees of freedom enter via the introduction of a formation time for hadrons produced in the fragmentation of strings. The leading hadrons of the fragmenting strings contain the valence-quarks of the original excited hadron. In UrQMD they are allowed to interact even during their formation time, with a reduced cross section defined by the additive quark model.

Figure 1 shows the rapidity spectra of various hadron species in central (b<3 fm) Au+Au reactions at $\sqrt{s} = 200$ AGeV. Full symbols denote calculations with full rescattering, whereas open symbols denote calculations without meson-meson and meson-baryon interactions.

The proton distribution (in the calculation with rescattering) shows a plateau over rapidity with 20 protons at central rapidities (top left). Without rescattering the proton distribution exhibits a dip at central rapidity values. The UrQMD calculations indicate a net-proton rapidity density of approx. 12 around midrapidity (top right), whereas the pQCD based approach VNI predicts a density of only 3. This large difference should allow experiments to discriminate those models. The predicted negatively charged particle abundancies, $\approx$ 400 at midrapidity, are in the expected $h^-$ multiplicity range which reaches from 300 to 600.

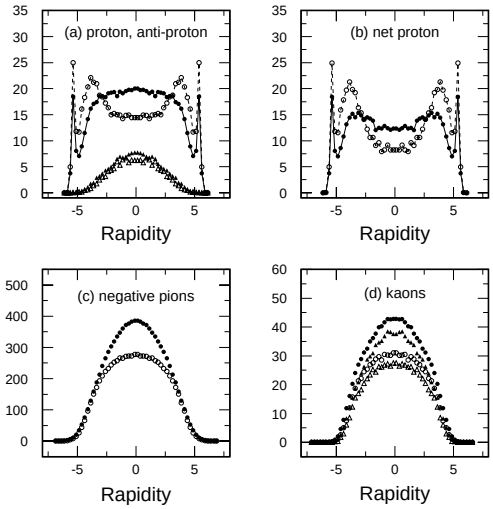


Figure 1: Au+Au, $\sqrt{s}$ = 200 AGeV, b<3 fm. Full symbols denote calculations with full rescattering. Open symbols denote calculations without meson-meson and meson-baryon interactions.
(a) Rapidity density of protons (circles) and anti-protons (triangles), (b) of net-protons, (c) of negatively charged pions, (d) of $K^+$ (circles) and $K^-$ (triangles).

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[1] M. Bleicher et al., hep-ph/9911420
[2] M. Bleicher et al., J.Phys.G25:1859-1896,1999